



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/762,789	01/22/2004	Douglas G. Anderson	039035/267930	6124
826 7590 03/20/2007 ALSTON & BIRD LLP BANK OF AMERICA PLAZA 101 SOUTH TRYON STREET, SUITE 4000 CHARLOTTE, NC 28280-4000			EXAMINER KALAM, ABUL	
			ART UNIT	PAPER NUMBER
			2814	
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		03/20/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/762,789

Applicant(s)

ANDERSON, DOUGLAS G.

Examiner

Abul Kalam

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 December 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) 11-13 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Species I, drawn to claims 1-10, in the reply filed on December 19, 2006 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. **Claims 1-3, 6, 7 and 9** are rejected under 35 U.S.C. 102(b) as being anticipated by **Bryan et al. (US 6,263,941; newly cited, hereinafter, Bryan)**.

With respect to **claim 1**, **Bryan** teaches (**FIG. 1A**) an intermediate wafer assembly comprising:

a handle wafer (**14**); and

a bonded wafer (**12**) comprising a substrate (**12**) having opposed first and second major surfaces (**top and bottom surfaces**) and a peripheral edge (**20**)

Art Unit: 2814

extending therebetween, wherein the bonded wafer (12) is attached to said handle wafer (14) such that the first major surface (**top surface of wafer 12**) faces away from the handle wafer (14) and the second surface faces toward the handle wafer, and wherein a cross-sectional profile of the edge (20) comprises:

an angled edge segment (**see FIG. 1A below**) adjacent the first major surface (**top surface of wafer 12**) that extends linearly at a predefined angle relative to a reference plane defined by the first major surface;

and a curved edge segment (**see FIG. 1A below**) that defines a continuous curve extending from the angled edge segment to the second major surface (**col. 3: Ins. 34-54**).

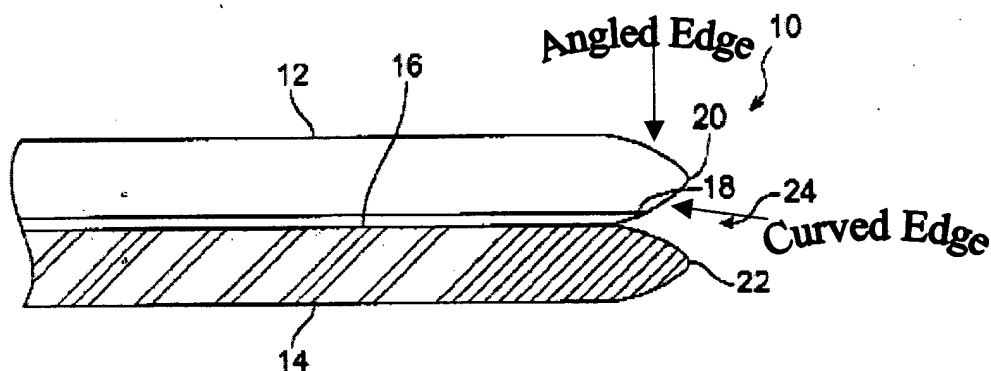


FIG. 1A

With respect to **claim 2**, Bryan teaches the intermediate wafer assembly as set forth above in claim 1, wherein the curved edge segment comprises a radiused surface extending from the angled edge segment to the second major surface (**see FIG. 1A above; col. 3: Ins. 42-44**).

Art Unit: 2814

With respect to **claim 3**, **Bryan** teaches the intermediate wafer assembly as set forth above in claim 1, wherein the second major surface (**bottom surface of wafer 12**) has a smaller diameter than a medial portion of said substrate (**12**) between said first and second major surfaces (**FIG. 1A**).

With respect to **claim 6**, **Bryan** teaches (**FIG. 1A**) an intermediate wafer assembly comprising:

a handle wafer (**14**); and

a bonded wafer (**12**) attached to said handle wafer, said bonded wafer comprising a first major surface (**top surface of wafer 12**) faces away from the handle wafer (**14**) and a second surface faces toward the handle wafer, said bonded wafer further comprising an angled edge segment (**see FIG. 1A below**) adjacent the first major surface (**top surface of wafer 12**) that extends linearly at a predefined angle relative to a reference plane defined by the first major surface;

wherein said handle wafer and said bonded wafer each include a respective edge (**22 and 20, respectively**) extending peripherally thereabout, wherein the edge of each respective wafer defines a radiused surface (**see FIG. 1A below**) that extends continuously to an interface (**16**) between said handle and bonded wafers (**14 and 12**), wherein the radiused surface (**see FIG. 1A below**) of said bonded wafer extends continuously from the angled edge segment to the second major surface (**col. 3: Ins. 34-54**).

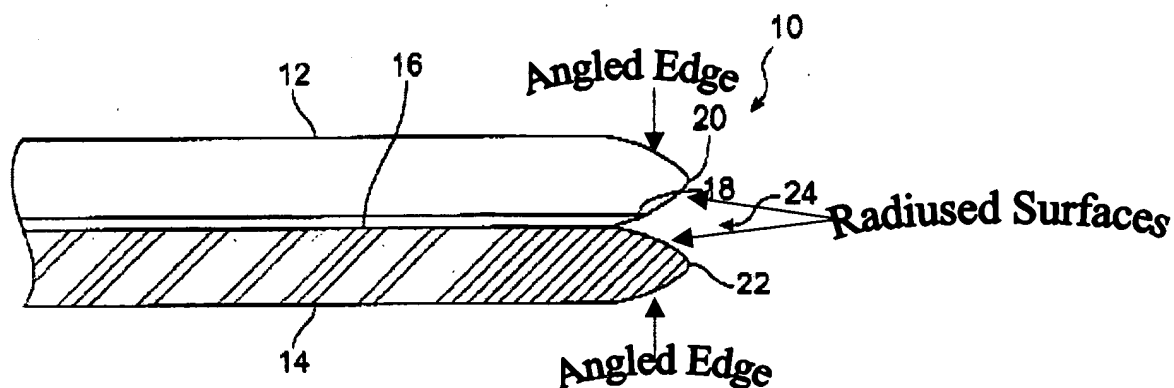


FIG. 1A

With respect to **claim 7**, **Bryan** teaches the intermediate wafer assembly as set forth above in claim 6, wherein said handle wafer (14) comprises opposed major surfaces, and wherein the major surface of each wafer that is proximate the interface (16) has a smaller diameter than a medial portion of the respective wafer between the opposed major surfaces (**FIG. 1A**).

With respect to **claim 9**, **Bryan** teaches the intermediate wafer assembly as set forth above in claim 6, wherein said handle wafer (14) comprises opposed major surfaces, and wherein a cross-sectional profile of the edge (22) of the handle wafer (14) also includes an angled edge segment (**see FIG. 1A above**), adjacent the major surface opposite the interface (16), that extends linearly at a predefined angle relative to a reference plane defined by the respective major surface.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 4 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Bryan ('941)** as applied to claims 3 and 7 above, respectively.

With respect to claim 4, **Bryan** teaches the intermediate wafer assembly of claim 3 above, including wherein the medial portion of the substrate (12) has the largest diameter and that the diameter of the second major surface is smaller than a diameter of the medial portion (FIG. 1A).

Thus, **Bryan** is shown to teach all the features of the claim with the exception of explicitly disclosing: wherein the diameter of the second major surface is between 100 microns and 300 microns smaller than a diameter of the medial portion of the substrate.

However, note that the specification contains no disclosure of either the *critical nature of the claimed* "diameter of the second major surface is between 100 microns and 300 microns smaller than a diameter of the medial portion of the substrate," or any unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the bonded wafer of **Bryan** with the diameter of the second major surface in a range as claimed because the diameter of the second major surface can be optimized during routine experimentation to prevent chipping of the wafer assembly and thus provide reliability to the semiconductor substrate.

With respect to **claim 8**, **Bryan** teaches the intermediate wafer assembly of claim 7 above, including wherein the diameter of the major surface of each wafer that is proximate the interface (**16**) is smaller than a diameter of the medial portion of the respective wafer having the largest diameter (**FIG. 1A**).

Thus, **Bryan** is shown to teach all the features of the claim with the exception of explicitly disclosing: wherein the diameter of the major surface of each wafer that is proximate the interface is between 100 microns and 300 microns smaller than a diameter of the medial portion of the respective wafer.

However, note that the specification contains no disclosure of either the *critical nature of the claimed* "diameter of the major surface of each wafer that is proximate the interface is between 100 microns and 300 microns smaller than a diameter of the medial portion of the respective wafer," or any unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide each of the wafers of **Bryan** with the diameter of the major surface in a range as claimed because the diameter of the major surface can be optimized during routine experimentation to prevent chipping of the wafer assembly and thus provide reliability to the semiconductor substrate.

7. **Claims 5 and 10** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Bryan ('941)** as applied to claims 1 and 6 above, respectively, and further in view of **Ito et al. (US 5,152,857; previously cited, hereinafter, Ito)**.

With respect to **claims 5 and 10**, **Bryan** teaches the intermediate wafer assembly set forth above in claims 1 and 6, respectively. However, **Bryan** does not explicitly disclose wherein the first major surface of the bonding wafer has a smaller diameter than the second major surface.

However, **Ito** teaches an intermediate wafer assembly (**FIG. 1B**) wherein the first major surface (**top surface of wafer 21b**) of the bonding wafer (**21b**) has a smaller diameter than the second major surface (**bottom surface of wafer 21b**) (**col. 5: Ins. 21-27, 61-67; col. 6: line 1**).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of **Bryan and Ito**, to form an intermediate wafer assembly wherein the top surface of the bonding wafer has a smaller diameter than the bottom surface, for the for the disclosed intended purpose of preventing

cracking or chipping from occurring in the periphery of the wafer, and thus improving the structural reliability of the wafer assembly (col. 6: Ins. 1-12).

Response to Arguments

Applicant's arguments with respect to claims 1-10 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

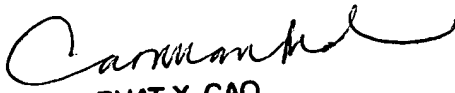
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Abul Kalam whose telephone number is 571-272-8346. The examiner can normally be reached on Monday - Friday, 9 AM - 5 PM.

Art Unit: 2814

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ak


PHAT X. CAO
PRIMARY EXAMINER